INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH

CONTENTS

Volume 29, 1991

International Journal of Production Research

Editor
Professor Roy J. Sury, Ph.D., C.Eng.
Department of Manufacturing Engineering, Loughborough University of Technology
Leicestershire LE11 3TU, UK

Associate Editor
John E. Middle, M.Sc., C.Eng.
Department of Manufacturing Engineering
Loughborough University of Technology

Reviews Editor
Geoffrey F. Modlen, Ph.D., C.Eng.
Department of Manufacturing Engineering
Loughborough University of Technology

Editorial Board

Australia:	Dr. G. M. Buxey, Deakin University.
	Dr. B. W. Jenney, Chisholm Institute of Technology, Victoria.
Canada:	Professor A. K. S. Jardine, University of Toronto.
	Professor M. Osman, Concordia University, Quebec.
Denmark:	Professor C. H. Gudnason, Danmarks Tekniske, Højskole, København.
France:	Professor G. Doumeingts, University of Bordeaux.
	Dr. J. B. Lasserre, Laboratoire d'Automatique et d'Analyse des Systems, Toulouse.
Germany:	Professor Dr.-Ing. H. Bullinger, Fraunhofer-IAO, Stuttgart.
	Professor Dr.-Ing. W. Laurig, Institut fur Arbeitsphysiologie, Dortmund.
	Professor Dr.-Ing. H. J. Warnecke, Fraunhofer-IPA, Stuttgart.
Hong Kong:	Professor N. N. S. Chen, University of Hong Kong.
Holland:	Professor W. Bakker, Twente University of Technology, Enschede.
Hungary:	Professor Dr. F. J. Lettner, Budapest Müszaki Egyetem, Gépipari Technológiai Tanszék, Budapest IX.
India:	Professor N. K. Tewari, Indian Institute of Technology, New Delhi.
Israel:	Professor E. Dar-El, Technion-Israel Institute of Technology, Haifa.
	Professor D. Sipper, Tel Aviv University.
Japan:	Professor Y. Furukawa, Tokyo Metropolitan University, Tokyo.
	Professor K. Hitomi, P. E., P.Econ., Kyoto University Beijing Institute of Technology, Southwestern Jiaotong University and Nanjing University (China).
	Professor R. Muramatsu, Waseda University, Tokyo 160.
New Zealand:	Professor L. Foulds, Department of Management Systems, University of Waikato, Private Bag 3105, Hamilton.
Singapore:	Professor S. K. Leung, Nanyang Technological Institute.
Sweden:	Professor S. Axsäter, Luleå University of Technology.
United Kingdom:	Professor C. Andrew, University of Cambridge.
	Professor R. Bell, Loughborough University of Technology.
	Professor J. Burbidge, Cranfield Institute of Technology, Bedford.
	Professor J. Parnaby, Lucas Industries, Solihull.
USA:	Professor G. Boothroyd, University of Massachusetts, Amherst.
	Professor N. Gaither, Texas A & M University, College Station.
	Dr. S. B. Gershwin, Massachusetts Institute of Technology, Cambridge.
	Professor K. Knott, The Pennsylvania State University.
	Professor E. Koenigsberg, University of California, Berkeley.
	Professor A. Kusiak, The University of Iowa.
	Professor A. Mital, University of Cincinnati, Ohio.
	Professor C. Moodie, Purdue University, West Lafayette, Indiana.
Yugoslavia:	Professor D. Zelenović, University of Novi Sad.
Founding Editor:	Professor N. A. Dudley, Emeritus Professor, University of Birmingham, UK

Subscription Information

International Journal of Production Research (ISSN 0020-7543) is published monthly by Taylor & Francis Ltd, 4 John Street, London WC1N 2ET, UK.

Annual subscription 1992 £483, US $830.

Personal subscription 1992 to members of the Institution of Manufacturing Engineers: £70, US $142. Personal subscriptions are available to home addresses only, and must be paid by personal cheque or credit card.

Second class postage paid at Jamaica, New York 11431. USA Postmasters: Send address changes to *International Journal of Production Research*, Publications Expediting Inc., 200 Meacham Avenue, Elmont, NY 11003. Air freight and mailing in the USA by Publications Expediting Inc., 200 Meacham Avenue, Elmont, NY 11003.

Printed in UK by Burgess Science Press, Rankine Road, Basingstoke, Hampshire RG24 0PR, UK. The paper used in this publication is 'acid-free' and conforms to the American National Standards Institute requirements in this respect.

Dollar rates apply to subscribers in all countries except the UK and the Republic of Ireland where the pound sterling price applies. All subscriptions are payable in advance and all rates include postage. Journals are sent by air to the USA, Canada, Mexico, India, Japan and Australasia. Subscriptions are entered on an annual basis, i.e. January to December. Payment may be made by sterling cheque, dollar cheque, international money order, National Giro, or credit card (Amex, Visa, Masterdard/Access).

Orders originating in the following territories should be sent direct to the local distributor. **Australia:** R. Hill & Son Ltd, Suite 2, 119 Gardenvale Road, Gardenvale, Vic. 3185, Australia. **New Zealand:** R. Hill & Son Ltd, Private Bag, Newmarket, Auckland 1. **India:** Universal Subscription Agency Pvt. Ltd, 101–102 Community Centre, Malviya Nagar Extn, Post Bag No. 8, Saket, New Delhi 110017. **Japan:** Kinokuniya Company Ltd, Journal Department, PO Box 55, Chitose, Tokyo 156. **USA, Canada and Mexico:** Taylor & Francis, Inc., 1900 Frost Road, Suite 101, Bristol, PA 19007. **UK and all other territories:** Taylor & Francis Ltd, Rankine Road, Basingstoke, Hampshire RG24 0PR.

Advertisements

All enquiries to Taylor & Francis Ltd, Basingstoke (0256) 840366 or Taylor & Francis Inc., Washington (202) 289 2174.

Copyright © 1991 The Institution of Manufacturing Engineers

International Journal of Production Research

VOLUME 29, 1991—CONTENTS

No. 1 January 1991

	PAGE
A dynamic programming model for the kanban assignment problem in a multistage multiperiod production system. A. LI and H. C. CO ...	1
Framework for dynamic positioning of storage/retrieval machines in an automated storage/retrieval system. P. J. EGBELU	17
Demand management strategies for assemble-to-order production environments. H. H. GUERRERO	39
A flexible approach to part type selection in flexible flow systems using part mix ratios. K. E. STECKE and I. KIM	53
The sensitivity of set-up cost estimation on the problem of joint lot sizing and scheduling. D. M. DILTS	77
Set-up reduction and inventory turnover rate. J. OLHAGER and B. RAPP ...	95
On the economic ordering quantity for jointly replenished items. M. KASPI and M. J. ROSENBLATT...	107
Designing and phasing in just-in-time production systems. J. MILTENBURG and J. WIJNGAARD	115
A two-stage feature-based design system. R.-K. LI, B.-W. TAUR and H-J. SHYUR	133
Design of multiple criteria sampling plans and charts. Z. DREZNER and G. O. WESOLOWSKY	155
A hierarchical approach to the facility layout problem. K. Y. TAM and S. G. LI	165
A new approach for project scheduling with a limited resource. M. M. KHATTAB and F. CHOOBINEH	185
The optimization of rotary cutting plasma assisted machining conditions of hard coatings. L. M. KOZHURA and J. O. OSARENREN	199
Technical note. An expediting heuristic for the shortest processing time dispatching rule. M.-H. YE and G. B. WILLIAMS	209
Discussion. A note on a linear cell clustering algorithm. W. S. CHOW ...	215
Reply to 'A note on a linear cell clustering algorithm'. J. C. WEI and G. M. KERN	217
Book reviews	219
Announcement and Call for Papers	223

No. 2 February 1991

PAGE

ROBOTIC ASSEMBLY

Guest editorial 225

Materials handling for general purpose assembly. A. H. REDFORD ... 229

A two-stage assembly process planning tool for robot-based flexible assembly systems. J. BROWNE, K. TIERNEY and M. WALSH 247

Economic evaluation of robot-based assembly systems. A. M. DORE and E. K. LO 267

A strategy for sensors and rules in flexible robotic assembly. K. K. W. SELKE, H. C. SHEN, G. E. DEACON and A. PUGH 277

Force sensing as an aid to assembly. S. H. HOPKINS, C. J. BLAND and M. H. WU 293

Strategies for gripper design and selection in robotic assembly. D. T. PHAM and S. H. YEO 303

Knowledge base design for flexible assembly robots. O. F. OFFODILE, W. M. MARCY and S. L. JOHNSON 317

* * * * * * *

Embedding JIT into MRP. S. D. P. FLAPPER, G. J. MILTENBURG and J. WIJNGAARD 329

A linear formulation of the machine-part cell formation problem. F. F. BOCTOR 343

In-process measurement problems in machine tool applications. R. I. GROSVENOR, C. KHARPOUTLY and K. F. MARTIN 357

Impact of sequence of operations and layout of cells in cellular manufacturing. R. LOGENDRAN 375

Surface quality of holes drilled into aluminium 390. H. R. LEEP, E. D. HALBLEIB and Z. JIANG 391

A rule-based approach to the trim-loss problem. R. D. DIETRICH and S. J. YAKOWITZ 401

Total tool requirements in multi-level machining systems. C. P. KOULAMAS 417

Call for papers 439

No. 3 March 1991

A cost estimation model for advanced manufacturing systems. Y. K. SON 441

A two-dimensional decision algorithm for real-time tool monitoring. S. A. JALALI and W. J. KOLARIK 453

GRAFICS—a nonhierarchical clustering algorithm for group technology. G. SRINIVASAN and T. T. NARENDRAN 463

PAGE

Flowshop scheduling with set-up, processing and removal times separated. C. PROUST, J. N. D. GUPTA and V. DESCHAMPS 479

Modelling of an automated guided vehicle system (AGVS) in a just-in-time (JIT) environment. L. G. OCCEÑA and T. YOKOTA 495

Development of a process determination and sequencing technique for a manufacturing system. P.-T. CHIANG and J. C. S. YANG 513

Fixturing strategies and geometric queries in set-up planning. R. I. M. YOUNG and R. BELL 537

Statistical control of manufacturing cycle time and project time: lessons from statistical process control. P. M. SWAMIDASS and C. MAJERUS 551

Effect of the stiffness characteristics of the stuffing box on boring bar vibrations. Y. B. GESSESSE and V. N. LATINOVIC 565

An interactive on-line multi-objective optimization approach with application to metal cutting turning operation. B. MALAKOOTI 575

Digital servo motion control of air motors. J. PU, P. R. MOORE and R. H. WESTON 599

Improving the equality of workload assignments in assembly lines. R. RACHAMADUGU and B. TALBOT 619

Throughput of a constant work in process manufacturing line subject to failures. W. J. HOPP and M. L. SPEARMAN 635

No. 4 April 1991

The just-in-time philosophy: A literature review. D. Y. GOLHAR and C. L. STAMM 657

A knowledge-based preprocessor generator for coordinate-measuring machines. D. T. PHAM, K. F. MARTIN and L. P. KHOO 677

Batch production time in a multi-stage system with material-handling consideration. P. J. EGBELU 695

Flow rate flexibility in complex production departments. J. W. M. BERTRAND and H. P. G. VAN OOIJEN 713

Modelling, optimization and response curves of milling low carbon steel. S. M. A. SULIMAN and G. A. HASSAN 725

A preliminary investigation of multi-attribute based sequencing rules for assembly shops. P. R. PHILIPOOM, R. S. RUSSELL and T. D. FRY ... 739

Layout considerations in assembly line design. R. RACHAMADUGU and J. G. SHANTHIKUMAR 755

Hierarchical production planning system for a two-stage process. H. TSUBONE, H. MATSUURA and T. TSUTSU 769

A comparative study of US manufacturing firms at various stages of just-in-time implementation. N. U. AHMED, E. A. TUNC and R. V. MONTAGNO ... 787

PAGE

Selecting a flexible manufacturing system using multiple criteria analysis. A. STAM and M. KUULA 803

Determination of optimal lot sizing parameters and a controllable process mean for a production system. T. GUPTA and D. Y. GOLHAR 821

A 'fuzzy' approach to facilities lay-out planning. A. D. RAOOT and A. RAKSHIT 835

Book reviews 859

Corrigendum 861

Announcements 863

No. 5 May 1991

Conflict detection of automated guided vehicles: a Petri net approach. L. ZENG, H.-P. WANG and S. JIN 865

Determining the number of kanbans in a multiproduct, multistage production system. J. F. BARD and B. GOLANY 881

Inspection configuration and reprocessing decisions in serial production systems. M. RAGHAVACHARI and G. K. TAYI 897

Information theoretic measures of inspection performance. T. RAZ ... 913

Progress functions: a general model. D. A. REIS 927

A systems theoretic view of computer integrated manufacturing. F. P. M. BIEMANS and C. A. VISSERS 947

Modelling the performance of a mobile robot with RTM. B. REMBOLD and S. Y. NOF 967

Free-transfer lines with unreliable assembly stations and small buffers. J. FIGOUR, B. JOLLÈS and C. MASCLE 979

Alternate method for the justification of advanced manufacturing technologies. I. KRINSKY and J. MILTENBURG 997

A correlation betweeen deviations in form and size tolerances. C. COGUN 1017

A linear-programming model formulation for optimal product-mix decisions in material-requirements-planning environments. H. C. BAHL, S. TAJ and W. CORCORAN 1025

A method for selecting dimensions, tolerances and precisions for alignment. C. DOYDUM and N. D. PERREIRA 1035

Scheduling approaches for random job shop flexible manufacturing systems. J. HUTCHISON, K. LEONG, D. SNYDER and P. WARD 1053

Multimode machine tools—a concept that improves operations of flexible manufacturing systems. V. CARIAPA 1069

No. 6 June 1991

PAGE

A Hamiltonian path approach to reordering the part-machine matrix for cellular manufacturing. R. G. ASKIN, S. H. CRESSWELL, J. B. GOLDBERG and A. J. VAKHARIA ... 1081

Determine a vision system's 3D coordinate measurement capability using Taguchi methods. Y.-R. SHIAU and B. C. JIANG ... 1101

Structured development of a generic workstation controller. R. G. WENDORF and F. P. M. BIEMANS ... 1123

Scheduling a single machine to maximize net present value. S. R. LAWRENCE 1141

A fuzzy approach to multi-objective routing problem with applications to process planning in manufacturing systems. N. SINGH and B. K. MOHANTY 1161

Analysis of operating strategies in test/repair areas. B. DOSHI ... 1171

Automatic tool selection for rough turning. P. G. MAROPOULOS and S. HINDUJA ... 1185

Balancing assembly lines for teams and work groups. R. V. JOHNSON ... 1205

Computer-aided panel layout using a multi-criteria heuristic algorithm. M. J. WANG, C. M. LIU and Y. S. PAN ... 1215

Capacitated dynamic lotsizing heuristics for serial systems. J. MAES and L. N. VAN WASSENHOVE ... 1235

Data dependent systems methodology for validation of simulation models illustrated by end-milling. S. M. PANDIT and G. LIN ... 1251

On constructing a block layout by graph theory. M. M. D. HASSAN and G. L. HOGG ... 1263

Optimal hybrid push/pull control strategies for a parallel multistage system: Part I. T. J. HODGSON and D. WANG ... 1279

Announcements ... 1289

No. 7 July 1991

Intelligent design synthesis: an object-oriented approach. A. KUSIAK, E. SZCZERBICKI and R. VUJOSEVIC ... 1291

Part ordering through simulation-optimization in an FMS. Y.-H. LEE and K. IWATA ... 1309

Integrated knowledge-based machining system for rotational parts. S. H. YEO, Y. S. WONG and M. RAHMAN ... 1325

On-line condition monitoring of tool wear in end milling using acoustic emission. R. H. OSURI, S. CHATTERJEE and S. CHANDRASHEKHAR ... 1339

Hardening and reconditioning machine components by electromagnetic coating. L. M. KOZHURA and J. O. OSARENREN ... 1355

Dynamic rules for due-date assignment. M. M. VIG and K. J. DOOLEY ... 1361

PAGE

Grouping methods for printed circuit board assembly. O. MAIMON and A. SHTUB 1379

A novel approach to decomposition of design specifications and search for solutions. A. KUSIAK, E. SZCZERBICKI and K. PARK 1391

Scheduling job shops with delays. G. J. VAN RYZIN, S. X. C. LOU and S. B. GERSHWIN... 1407

The Total Source Error of Adjustment model: A methodology for the elimination of setup and process adjustment. D. S. COCHRAN and K. SWINEHART 1423

A new heuristic algorithm for capacity planning in a manufacturing facility under learning. S. MANIVANNAN and C.-F. HONG 1437

Optimal hybrid push/pull control strategies for a parallel multistage system: Part II. T. J. HODGSON and D. WANG 1453

A decision support system for factory automation: a case study. Y. K. SON 1461

A fuzzy clustering approach to manufacturing cell formation. C.-H. CHU and J. C. HAYYA 1475

Schedules for a two-stage hybrid flowshop with parallel machines at the second stage. J. N. D. GUPTA and E. A. TUNC 1489

Book reviews 1503

Announcements 1505

No. 8 August 1991

Accommodating diverse shapes within hexagonal pavers. F. KOROUPI and M. LOFTUS 1507

Effective heuristics for the single machine sequencing problem with ready times. J. LIU and B. L. MACCARTHY 1521

The cost of eliminating exceptional elements in group technology cell formation. G. M. KERN and J. C. WEI 1535

DBGRIP: A learning expert system for detailed selection of robot grippers. D. T. PHAM and E. TACGIN 1549

The application of cognitive simulation techniques to work measurement and methods analysis of production control tasks. M. R. LEHTO, J. SHARIT and G. SALVENDY 1565

High-gain control and tuning strategy for vane-type reciprocating pneumatic servo drives. J. PU, P. R. MOORE and R. H. WESTON 1587

Analysis of flexible machining cells for unmanned production. K. OHASHI and K. HITOMI 1603

All-unit discounts, multi-item inventory model with stochastic demand, service level constraints and finite horizon. A. MEHREZ and D. BEN-ARIEH ... 1615

PAGE

Computer aided robot selection: the 'multiple attribute decision making' approach. V. P. AGRAWAL, V. KOHLI and S. GUPTA 1629

Location and sequencing of imperfect inspection operations in serial multi-stage production systems. T. RAZ and M. KASPI 1645

Using V–A–T analysis for determining the priority and location of JIT manufacturing techniques. A. LOCKAMY III and J. F. COX III 1661

Three-dimensional packing—solution approaches and heuristic development. W. B. DOWSLAND 1673

Multi-facility capacity expansion in R&D projects. M. BARAD 1687

Two graph-theoretic procedures for an improved solution to the facilities layout problem. L. A. AL-HAKIM 1701

Book reviews 1719

Announcements 1723

No. 9 September 1991

Intersection graph method for AGV flow path design. D. SINRIECH and J. M. A. TANCHOCO 1725

Integration of simulation and analytical submodels for supporting manufacturing decisions. P. J. STARR 1733

The introduction and development of a quality improvement process: a study. D. NEWALL and B. G. DALE 1747

Statistical process control and the Taguchi method: a comparative evaluation. W. C. BENTON 1761

A neural network system for shape-based classification and coding of rotational parts. S. KAPARTHI and N. C. SURESH 1771

A method of measuring quality costs. Y. K. SON and L.-F. HSU 1785

Data-driven generic simulators for flexible manufacturing systems. R. M. O'KEEFE and J. HADDOCK 1795

An investigation of injection pressure predictions in flow simulation packages. G. P. MAUL, G. R. GLOZER and U. ENGELFRIED 1811

An extended multi-objective replacement model for flexible automation investments. N. C. SURESH 1823

Constrained 'look-ahead' manufacturing. M. B. ROSENWEIN, R. E. STONE and E. T. WAHLS 1845

The decoupling of product and process life cycles. H. NOORI. 1853

Feature reasoning for sheet metal components. B. O. NNAJI, T.-S. KANG, S. YEH and J.-P. CHEN 1867

PAGE

Machine parameter selection for turning with constraints: an analytical approach based on geometric programming. B. GOPALAKRISHNAN and F. AL-KHAYYAL 1897

Machine capacity planning in group technology. D. R. SULE 1909

A comparison of exhaustive and non-exhaustive group scheduling heuristics in a manufacturing cell. F. MAHOODI and K. J. DOOLEY 1923

No. 10 October 1991

Constraint-based control of flexible flow lines. S. RABAN and R. N. NAGEL 1941

Quantity discount decisions under conditions of multiple items, multiple suppliers and resource limitations. W. C. BENTON 1953

The pallet packing problem for non-uniform box sizes. C. S. CHEN, S. SARIN and B. RAM 1963

Do today's projects need powerful network planning tools? J. B. KIDD ... 1969

A multiple criteria decision making approach for the assembly line balancing problem. B. MALAKOOTI 1979

Heuristic solution to the scheduling problems in flexible manufacturing system. S. K. MUKHOPADHYAY, B. MAITI and S. GARG 2003

A model for determining job throughput times for manufacturing flow line workcells with finite buffers. T. PARK and H. J. STEUDEL 2025

The effect of machine breakdowns and interstage storage on the performance of production line systems. F. S. HILLIER and K. C. SO 2043

Tandem queues and kanban-controlled lines. B. J. BERKLEY 2057

Narrowing the gap? Stock turns in the Japanese and Western car industries. R. DELBRIDGE and N. OLIVER 2083

A close neighbour algorithm for designing cellular manufacturing systems. W. J. BOE and C. H. CHENG 2097

Examining the use of dedicated and general purpose pallets in a dedicated flexible manufacturing system. W. E. NEWMAN, W. J. BOE and D. R. DENZLER 2117

Age-maintenance of an M/G/1 production system. H. C. CO and A. ARAAR 2135

Economic design of a complete inspection plan with feedback control. Y. V. HUI 2151

Book reviews 2159

No. 11 November 1991

Automatic cutter selection and optimal cutter path generation for prismatic parts. M. BALA and T.-C. CHANG 2163

PAGE

Rotary ultrasonic machining—a new cutting process and its performance. M. KOMARAIAH and P. NARASIMHA REDDY 2177

Analysis and optimization of parameter combinations in wire electrical discharge machining. D. SCOTT, S. BOYINA and K. P. RAJURKAR ... 2189

Effects of loading and routeing decisions on performance of flexible manufacturing systems. I. J. CHEN and C.-H. CHUNG 2209

Seed selection procedures for cell formation heuristics. G. V. FRAZIER and N. GAITHER 2227

A generic IDEFo model of process planning. G. J. COLQUHOUN and R. W. BAINES 2239

Intelligent dispatching for flexible manufacturing. J. CHANDRA and J. TALAVAGE 2259

Filtering heuristics for rescheduling open orders in MRP systems. R. J. PENLESKY, U. WEMMERLÖV and W. L. BERRY 2279

On the design of deep-hole drills with non-traditional ejectors. V. P. ASTAHOV, J. FRAZAO and M. O. M. OSMAN 2297

A fuzzy multi-criteria decision-making method for facility site selection. G.-S. LIANG and M.-J. J. WANG 2313

Semi-Markov decision models for real-time scheduling. Y. YIH and A. THESEN 2331

Dispatch control of a fleet of remote-controlled/automatic load-haul-dump vehicles in underground mines. N. VAGENAS 2347

Tool replacement with adaptive control in a non-stationary non-periodic stochastic process. G. GALANTE and A. LOMBARDO 2365

Book review 2375

No. 12 December 1991

Conflict-free shortest-time bidirectional AGV routeing. C. W. KIM and J. M. A. TANCHOCO 2377

A heuristic algorithm to schedule work in the repair industry. S. C. JHAVERI and B. L. FOOTE 2393

Simultaneous determination of optimal machining conditions and tool replacement policies in constrained machining economics problems by geometric programming. C. P. KOULAMAS 2407

Analysis of optimal machining conditions for flow-type automated manufacturing systems. K. HITOMI 2423

Motion time calculation for numerically controlled machine-tools. B. PALLOT and R. DUCHAMP 2433

On scheduling parallel machines with two setup classes. J. RAJGOPAL and B. BIDANDA 2443

Controllable production rates in a family production context. I. Moon, G. Gallego and D. Simchi-Levi 2459

Expert systems in production and operations management: research directions in assessing overall impact. T. A. Byrd and R. D. Hauser 2471

A framework for modern manufacturing economics. Y. K. Son 2483

A transient-based real-time scheduling algorithm in FMS. N. Ishii and J. J. Talavage 2501

A comparison of solution methods for the assortment problem. D. D. Gemmill and J. L. Sanders 2521

Object-oriented simulation to support research in manufacturing systems. S. Adiga and C. R. Glassey 2529

Optimal preventive maintenance policies in a serial production system. L.-F. Hsu.. 2543

Referees 1990/91 2557

Index of Authors (with titles) 2565